

Study of the water cycle in pig farms and development of new methods for its use

Summary

Osona is one of the areas most severely affected by the problem of livestock manure, and according to the *Ministry of Agriculture, Livestock, Fisheries and Food*, 20% of Spain's total slurry is produced in Osona. Livestock manure in Catalonia is currently managed in three main ways: direct application to fields; external management by an authorised manager; in situ composting of the slurry.

Although many improvements are being made to the treatment of the solid part of the slurry, with technologies such as composting to reduce the concentration of organic matter, biodrying to produce energy, and other techniques, none of these technologies focus on reusing the water, or involve a comprehensive system which recovers all the effluents obtained based on the concept of "zero waste".

This project aims to evaluate the technologies of electro dialysis (ED), ozonation and composting for treating the effluents obtained in NDN slurry treatment facilities. The processes of ED and ozonation could reduce the content of nutrients and salts in the effluent in NDN, and this would enable this effluent to be reused, avoiding problems of salinisation and excess nutrients in the soil.

The new technological approach will provide a compost suitable for use in agriculture and water suitable for use on farms, either for cleaning or watering for livestock. The potential application of the concentrate obtained in ED by fertigation will also be considered.

Objectives

This project aims to provide a solution to one of the main limitations of NDN technology, by connecting NDN systems with electro dialysis and ozonation technologies to treat the liquid effluents obtained.

Apart from recovering the solid fractions by composting, the aim is to recover the liquid effluents from livestock manure by ED treatment and ozonation, thereby obtaining a high quality water without any pollutants, salts or nutrients that could be reused on the farm itself, or used for recharging aquifers and other environmental services.

Description of the measures planned in the project

The following actions will be carried out in order to achieve the aforementioned objectives:

- Operation and optimisation of the ED plant for the treatment of NDN effluent.
- Operation and optimisation of the ozonation plant for the purification of the ED permeate.
- Optimisation of the composting process of the solid fraction of slurry and NDN sludge.
- Assessment of the possible uses of the ED concentrate in fertigation.
- Assessment of compliance with regulations for discharge into river courses, industrial use and drinking water of the effluents obtained.
- Study of the technical-economic feasibility of the processes applied.

Expected results and practical recommendations

This study will obtain results that present the treatment of slurry from a "zero residue" perspective, recovering all the effluents obtained in the process and helping to close the water cycle on the farm. If the technical, economic and environmental evaluations suggest it is possible, the final implementation of an ED, ozonation and composting plant for treating all the effluents produced in the NDN plant at the Monellots farm is therefore expected. Another expected result is the transfer of this new technology to other farms and sectors, which will have a multiplier effect on the impact of the project at regional and international levels.

Leader of the Operational Group

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Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
Barcelona	Osona

Dissemination of the project (publications, seminars, multimedia, etc.)

The communication and dissemination of the project will also be a crucial factor in ensuring its success. The results are planned to be presented at Spanish and international conferences, and at workshops on livestock waste flow management. At the scientific level, publication of at least two scientific articles in high-impact journals is also anticipated. It will also be promoted through the social networks of the BETA Technological Centre: Twitter and LinkedIn, and there will be a direct partnership with the communication department of UVIC-UCC to work together on an effective strategy for raising the project's profile and disseminating it in local media.

Project website

Information on the project is available on the following websites: <http://www.betatechcenter.com>

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2019	Total budget: €135,716.91
Completion date (month-year):	DARP funding: €54,151.05
Current status: Underway	EU funding: €40,850.79
	Own funding: €40,715.07

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